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THE *BIELAN* METEORS OF NOVEMBER, 1892.

It will be remembered that the display of the *Bielan* meteors which had been predicted for November 27, 1892, actually occurred the night of November 23, and was observed quite generally throughout the United States. No explanation was offered at the time to account for their unusually early appearance, except possibly that the meteor stream through which the Earth was passing late in November had become very broad and the meteors irregularly distributed in it. Dr. BREDICHIN of Pulkowa has now shown that a very simple and ordinary mathematical explanation exists. The following extracts are translated from his short paper on the subject in *Astronomische Nachrichten*, No. 3154:

"The observations of the *Bielan* meteors on the 23d of November in America have shown that the collision of the thick part of this swarm with the Earth last year occurred almost four days earlier than in the year 1885; that is, that the descending node of the stream moved almost four degrees west during the interval between November, 1885, and November, 1892.

"It shows that this retrogression was caused by the perturbations produced by *Jupiter* upon that part of the swarm which possesses an equal (or nearly equal) mean daily motion as, earlier, BIELA'S comet had.

"The perturbations were especially large from the end of 1889 to the middle of 1891, reaching their maximum value in July, 1890, at 306° heliocentric longitude of *Jupiter*, when that planet was only about 1.24 astronomical units from the place of the former (BIELA) comet.

"An approximate computation of the special perturbations for the whole interval of the appreciable influence of *Jupiter* gives a total retrogression of the node of something over 4°, and a decrease of the inclination of the orbit of about 0°.6"

The influence of *Jupiter's* attraction, then, changed the orbits of the meteors in *that part of the stream* to such an extent that they collided with the Earth on November 23 instead of November 27, as they would have done had that attraction not existed. Dr. BREDICHIN has shown that the perturbations of meteor streams may be of sensible magnitude; and they must hereafter be taken into account in the predictions of meteor displays.

W. W. C.

The Driving Clock of the 36-inch Equatorial.

Apropos of a recent discussion in the *Observatory* concerning the power required to drive equatorial telescopes, I will give the data for the driving clock of the 36-inch telescope.

A weight of 810 pounds falls through 17.4 feet, and propels the telescope 131 minutes. This is equivalent to $\frac{1}{307}$ horse power. The power really required is much smaller than this, as is shown by the fact that the clock alone requires about $2^{m}\,20^{s}$ to pass from rest to full speed, while only $2^{m}\,30^{s}$ are required when the clock is clamped to the telescope. W. W. C.

Comet *b*, 1893.

The bright comet visible in July — the photographic and spectroscopic observations of which are described elsewhere in this number — was discovered independently by a large number of people. The telegrams notifying American observatories of the discovery gave the credit to Mr. Alfred Rordame, an amateur astronomer of Salt Lake City, Utah, who detected it by naked eye at 10 P. M. of July 8. He immediately notified Dr. Swift of Rochester by telegraph, who verified the discovery the next evening. Two gentlemen of Alta, Iowa, Messrs. Johnson and Miller, claim to have seen it about 8:30 P. M. of July 8, but their announcement did not reach astronomers till several days later. On July 9 it was discovered independently by Mr. Quènisset of Juvisy Observatory, France; by Mr. Filmer of Faversham, Kent, England; by Professor Boss of Albany; and by several others.

Late in August American astronomers learned from a published note by the director of the Madrid Observatory that the comet had been discovered on the morning of July 5 at Logrosan, Spain, by Mr. Roso de Luna, who considered it to be a *new star* of the fourth magnitude, in the constellation *Auriga*, without, unfortunately, attaching to the discovery the importance which it merited. A letter by the discoverer, date Logrosan, July 6, received at the Madrid Observatory July 8, called attention to the "new star," and located it, by means of a chart enclosed, with reference to the surrounding stars. Cloudy weather at Madrid prevented a verification of the discovery. From the orbit of the comet, now well determined, it has been found that the position